THE 21ST CENTURY STATE DOT

Message

- **Significant Opportunities** for improving future highway service will be derived from maximizing the service from the existing (constructed) network.
- Achieving this will require substantial changes in state DOT mission, practice and organization.



THE NEW NORMAL

A mature network and congested facilities

VS.
Just-in-time society

- "Normal" conditions are no longer average
 - Longer peaks
 - Increased Incidents
- Yet customers placing higher value on:
 - Improved reliability
 - Minimal delays, disruption
- Constraints to conventional improvement
 - Resource constraints (\$, ROW)
 - Long time frames (10 +)



NEW UNDERSTANDING OF "PERFORMANCE"

- Half of delay (and most of unreliability) is due to "non-recurring congestion" – not capacity shortfalls
 - Breakdowns and crashes
 - Construction workzones
 - Weather
 - Poor signal timing

Urban and rural

Much of this capacity can be recaptured through aggressive systems management



..... AND CAUSES OF LOSS OF PERFORMANCE

Type of Cause	Contribution to total delay	Cause of Delay	Basic Mitigation Strategy
Recurring Causes	35-45%	Infrastructure (roadway & transit) capacity shortfalls	Capacity
		Interchange bottlenecks	Increases
		Weave & merge friction	1)
		Poor signal timing	1
Non- Recurring Causes	55-65%	Breakdowns & Crashes	Systems
		Construction work	Management
		Weather	
		Vehicle mix	1 J
		Special events	1



CURRENT OPERATIONS REALITY

Mobility/Safety will increasingly be a function of:

- Improving efficiency (operational friction/throughput)
- Maintaining capacity in face of changing conditions (weather, demand)
- Responding to disruptions (crashes, breakdowns)
- Minimizing planned disruptions
- Integrating Vehicle and Infrastructure Operations



SUGGESTS A MAJOR NEW STATE DOT MISSION

"Operations and Management":

 Active management of the existing transportation system to maintain customer-focused performance in the face of congestion, incidents and other service disruptions



BEST PRACTICE INDICATE BENEFITS

EXAMPLE STRATEGY	BENEFITS	
Freeway Management	Ramp metering in Minneapolis: 22% decrease in mainline travel times (ramp metering = one new freeway lane/direction	
Arterial Operations	Adaptive signal controls/Canadian cities: delay decreases from 15-40% (typical C/B = 10-20:1)	
Incident Management	Aggressive Incident management such as Seattle, DC, San Antonio: reduced clearance times of 20-50%; reduced secondary accidents by 30%	
Work Zone Traffic Management	Extensive automation in Big I/Albuquerque: reduced average clearance times by 44% and reduced safety incidents by equal amount	
Traveler Information	Simulations show reductions in travel time of 1-3 percent and substantial increases in perceived reliability	
RWIS	Pre-event anti-icing program Idaho reduced accident frequencies by 83%	



PROGRESS = TECHNICAL CONCEPTS

NEW INSTITUTIONAL ARRANGMENTS

Source of Delay	Operations & Management Focus	Institutional Issues (beyond "systems")
Regional bottlenecks	•Next gen. freeway management (lane/speed/ramp controls)	•Local acceptance, cooperation
Inadequate signal timing	•Systematic deployment of traffic responsive tech	•Interjurisdictional consistency and sharing
Breakdowns and crashes	Full detection and surveillanceRamp, speed, lane control	•24X7 response •Formal IM programs •Aggressive comms to drivers
Construction work	•ITS and traffic-responsive features (ITS)	•Upgrade standards beyond MUTCD
Weather	•RWIS and driver info	Prediction/advisory/control regimes
Vehicle mix (CVO)	•Special routing (guidance info)	•Liaisons with intermodal players
Special events (tourism)	•Special operational regimes	•Liaison with tourism community (regional)



POTENTIAL IMPACT OF SYSTEMS OPERATIONS

- Beyond current low implementation -- to intense system-wide applications of ITS and Operations strategies
- Impact equal to 7-10 years of new currentrate of new capacity (TTI), but targeted on most frustrating delay components
- Fraction of cost, minimal disruption

Why not?



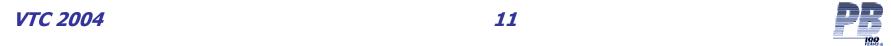
NATIONAL PROGRESS

- Bellwether states
- AASHTO Subcommittee on SO&M
- FHWA program establishment
- ITE-led National Coalition
- Strong Support in prospective Reauthorization
- Current Research



BEYOND CURRENT OPERATIONS BEST PRACTICE

- **1. PROACTIVE** predicting/mitigating potential service disruptions
- 2. AGGRESSIVE applications to gain control over behavior/operations
- **3. SYNERGISTIC** incorporate supply-side &demand-side strategies
- **4. AUTOMATED** for rapid response and control
- **5. RESPONSIVE** by manipulating existing capacity
- **6. INTERJURISDICTIONAL --** to provide seamless service
- **7. PARTNERED --** private cooperation for real time service provision
- 8. REGIONAL on an areawide multimodal basis
- **9. INTEGRATED** across vehicle and infrastructure functionalities
- **10.COMMUNICATED** -- directly to the customers (users)



IMPORTANT FOOTNOTES:

- 1. This is not a money issue (few states spending more that \$50m/year)
- 2. Visible performance payoff period is short
- 3. The trade-offs with other options are powerful
- 4. The customer credibility potential is huge compared to the options ("we can show visible results now")



BUT, TODAY IN MOST STATES:

- Policy commitment unclear
- Systems Operations not a Core Program
- Responsibility fragmented among divisions, offices
- Limited central accountability for performance
- Informal relationship with other players (PSAs)
- Unclear budgetary & staffing priority
- Minimal relationship with private vehicle & service providers



\$ELF-ASSESSMENT OF "MAINSTREAMING"

EXAMPLE INDICATOR	"ACTIVITIES" STAGE	"PROGRAM" STAGE
1. Authorizing Environment	Minimal policy and stakeholder	Legislative support evidenced in
	interest	funding or reporting requirements
2. Policy on systems operations & management	No specific reference in agency policy or strategic plan	Operations and management explicit as agency responsibility
3. Operations activities as a program	Basic deployment, but not considered a "core program"	Operations and management as consolidated program
4. Performance information	Level of service information is not regularly collected	Performance data is collected and utilized
5. Organizational alignment	Operations at 3 rd or managed as projects	Operations under single management at 2 nd level
6. Program regional consistency	Districts pursue individual approaches	Statewide policy on operations and management
7. Resource allocation to operations & management	Operations and management activities not separately budgeted	Operations and Management as Identifiable line item(s)
8. Stakeholder operational cooperation	Jurisdictions meet and share information	Shared concepts of operations, collocation
9. ITS in STIP and TIP	No identifiable Operations and management in plans	Operations and management an visible in capital program

PB

KEY PRECONDITIONS

- 1. Statewide mission priority on Customerfocused performance (Measured)
- 2. A formal systems management "program" with responsibility/authority
- 3. Commensurate budget and staff capacity to use it
- 4. Creation of information infrastructure
- 5. Formal interjurisdictional arrangements
- 6. A clear plan to move forward

VDOT is on its Way!!



CLOSING: ESTABLISHING AN OPERATIONS CULTURE?

• 20th Century

- Public works (output)
- Project-focused
- Our jurisdiction
- **8-5**
- Reactive
- Business as usual
- Do it our way

21st Century

- Mobility (outcomes)
- Customer-oriented
- The entire system
- 24X7
- Proactive
- Performance-driven
- Partnerships

